New Software Improves Fiber-Coating Process for Advanced Composites

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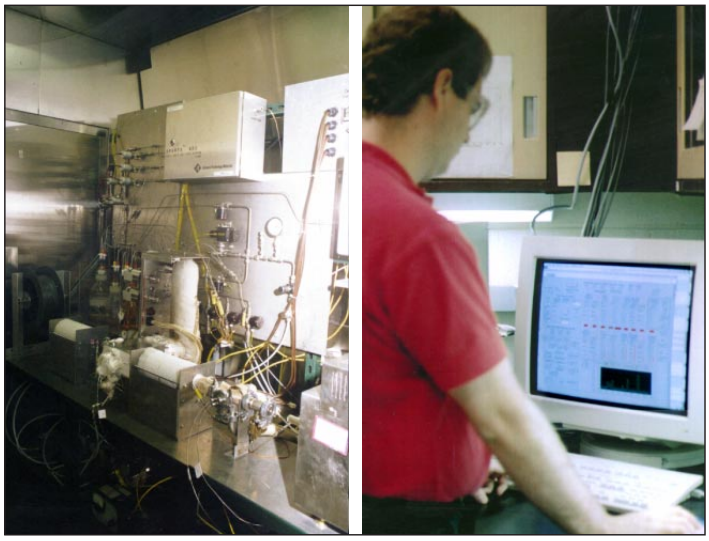

Payoff

The increased control provided by the new LabVIEW® software program over a manufacturing process used to apply high-temperature, oxidation resistant coatings on ceramic fibers will improve advanced composite product reliability and affordability. The successful transfer of this software program enables industry to work in parallel with the Air Force Research Laboratory in advancing the development of new materials that will improve power generation systems, aircraft engines and components vitally important to both the Air Force and aerospace industry.

Accomplishment

Research scientists at the Materials and Manufacturing Directorate developed a new computer software program that improves the manufacturing process used to make advanced composites. The LabVIEW® software program provides the capability to utilize a customized, graphical interface to control the hardware used to coat high-temperature fibers for advanced composite materials. Transfer of this program to Advanced Technology Materials (ATMI) Inc. of Danbury CT, in support of an ongoing Small Business Innovation Research (SBIR) program, has resulted in the development of an application that has dramatically increased the efficiency of ATMI's experimental work.

Background

Manufacturing processes used to make advanced composite materials need to be closely controlled in order to optimize product reliability and affordability. One way of achieving this is through the application of new software programs that enable an operator to exert greater control over the ceramic fiber coating process. The Directorate, together with ATMI, used the LabVIEW® software to develop and install a customized, graphical user interface program. The new interface program enables the user to control the chemical vapor deposition reactor used to apply the high-temperature, oxidation resistant coating on the fibers by specifying the reactor's mode and adjusting the appropriate valves, pumps, gas flow and temperature settings. At ATMI, this entails two liquid delivery pumps, 16 temperature controllers, four mass flow controllers (for gas flows) and 19 pneumatic valves. As a result of the increased control over the manufacturing process, the possibility of an error occurring in the process parameter setting is dramatically reduced. The real-time display of process parameter settings and readings makes it easy to identify process variations, enabling a more uniform coating of fibers throughout the finished composite material than would otherwise be the case. The new software program streamlines the fiber coating process by allowing the operator to adjust the valves, pumps, gas flow and temperature settings in mere seconds at the computer terminal.